

Appl. No. 09/171,910

REMARKS

Reconsideration is requested.

Claims 56-75 have been amended. Claims 56-75 are pending in this application.

The Examiner's withdrawal of the previous restriction requirement is acknowledged.

Claims 56-75 stand rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention.

Claims 56-75 have been amended to obviate the rejection under 35 U.S.C. §112, second paragraph.

Claims 56-75 are rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 3,770,859 to Bevan, in view of U.S. Patent No. 5,474,722 to Woodhams.

Claim 56, as amended, recites plastic-based composite product comprising a plastic mass in which particles are homogeneously embedded, which particles have tensile strength in a first particle direction, said product having a chosen principal product direction, wherein the particles comprise small particles being fibres and having a random orientation and a length of 0.2-2 mm, and large particles dominantly orientated such that their first particle direction is in said chosen principal product direction, said large particles having a length in the first particle direction of about 2-6 mm.

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In general, fibers have the shape of pieces of wire or thread. Therefore, fibers are always elongated. The dimensions in both directions perpendicular to the main direction (their first particle direction) are more or less equal and very small compared to the length in main direction. In the case of elongated plates, the dimensions in one of the two dimensions perpendicular to the main direction is larger than the other one.

Support for manipulating plates and fibers differently, due to their respective geometries, may be found in the specification from p. 7, line 25 to p. 8, line 6.

U.S. Patent No. 3,770,859 to Bevan teaches the production of a wall panel from a liquid settling powder and a fibrous support constituent. A powder fiber mix is poured into a mould. The fibers are oriented a main (horizontal) direction of the wall panel when their leading end hits the already compacted surface of a material in the mould and their trailing end continues to fall and tilts towards the horizontal position leading to fiber orientation lengthwise of the panel (see column 2, lines 44-51 of Bevan).

Although Bevan proposes to use relatively long, thick fibers and shorter and much finer or thinner fibers, Bevan fails to teach or suggest a product comprising small particles of 0.2 - 2 mm and large particles of about 2 - 6 mm in which the large particles are oriented in a principal product direction, but the smaller particles are oriented randomly. The fact that the product includes shorter fibers, does not mean that these shorter fibers are randomly oriented.

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In fact, they will be subjected to the same mechanism as the larger fibers when they hit the compacted mass and adopt a preferred orientation. The term "evenly distributed" used in Bevan is not the same as the term "randomly oriented".

In addition, Bevan discloses filling the mould with a dry powder fiber mix and to compact it, wherein after completing the filling of the mould the mould is immersed into a warm liquid bath in order to allow the water to set the powder. Bevan does not teach a plastic mass in which the particles are homogeneously embedded. Instead, Bevan relates to the production of water-based products.

Furthermore, Bevan suggests omitting the fine fiber inclusions in case of a specific length to breadth ratio of the powder crystals, provided that the long strands are present (column 4, lines 60-67 of Bevan).

U.S. Patent No. 5,474,722 to Woodhams discloses a reinforced thermoplastic composite material made by extrusion of a mixture of an orientable plastic material and an orientable particulate material. In the extrusion process, both the thermoplastic polymeric chains of the plastic material and all the dispersed particulate material are oriented in flow direction (see column 2, lines 15-33 of Woodhams).

Thus, Woodhams neither teaches nor suggests a product comprising small particles of 0.2 - 2 mm and large particles of about 2 - 6 mm in which the large particles are oriented in a principal product direction, but the smaller particles are oriented randomly. In fact, Woodhams suggests using as orientable particulate

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material also wood fibers some of which have been reduced to a tenth of their original size (column 5, lines 16-22 of Woodhams) or suggests using very short wood fibers as orientable particulate material (column 14, lines 18-36 of Woodhams).

Thus, where Woodhams mentions the use of small particles, the object is to use these particles as uni-orientable material, and not to randomly orient these small particles. In fact, the products according to the invention have been deliberately made avoiding the uni-orientation of polymeric chains and fibers as taught by Woodhams. Products made in accordance with Woodhams would have a very low resistance against splitting. According to the invention, it is not envisaged to orient the chains in the plastic mass (the plastic mass is not stretched), and the small particles are being oriented randomly, so as to provide for a large resistance against splitting in other directions, in particular the directions transverse to the direction of the large particles.

Consequently, even if one skilled in the art would consider combining the teachings of Bevan and Woodhams (which he would not since Bevan is related to reinforced water-based gypsum panels and Woodhams is related to reinforced thermoplastic material), he would not arrive at the product as described in Claim 56.

In fact, both Bevan and Woodhams teach away from such a product.

Therefore, claim 56 is allowable.

As claims 57-75 depend from claim 56, they too are allowable.

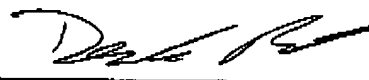
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In view of the foregoing, allowance of claims 56-75 is respectfully requested.

The Examiner is requested to telephone the undersigned if the Examiner believes such would facilitate prosecution of the present application. The undersigned is available for telephone consultation at any time.

Respectfully submitted,

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Same

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING
RESPONSE TO MARCH 14, 2002 FINAL OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions
and ~~strikeouts~~ indicate deletions.

56. (Amended) Plastic-based composite product comprising a plastic mass
in which particles are homogeneously embedded, which particles have tensile
strength in a first particle direction, said product having a chosen principal
product direction,

wherein the particles comprise:

small particles being ~~elongated plates or~~ fibres and having a random
orientation and a length of 0.2-2 mm; and

large particles dominantly orientated such that their first particle direction
is in said chosen principal product direction, said large particles having a length
in the first particle direction of about 2-6 mm.

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57. (Amended) Product as claimed in claim 55 56, wherein the particles are elongated.

58. (Amended) Product as claimed in claim 56 57, wherein the particles are made of wood material.

59. (Amended) Product as claimed in claim 57 58, wherein the wood particles consist of a material selected from the group consisting of fir, spruce, birch and poplar.

60. (Amended) Product as claimed in claim 56 57, wherein the large particles are fibres, and wherein the first particle direction is the longitudinal direction of each fibre.

61. (Amended) Product as claimed in claim 55 56, wherein the plastic mass is a thermoplastic polymer.

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62. (Amended) Product as claimed in claim ~~60~~ 61, wherein the particles include particles of wood material, wherein said wood material particles are elongated and have a length in the first particle direction and have a transverse dimension perpendicular to said first particle direction, the ratio between the length in the first particle direction and said transverse dimension ~~amounting to a minimum of 4~~ being 4 or more, wherein the wood particles are present in the plastic mass in a quantity of 40-80% by mass, and wherein the product complies with the following requirements relating to mechanical properties in

- bending strength in the first particle direction: at least 8 MPa
- bending modulus in the first particle direction: at least 3 GPa
- tensile strength in the first particle direction: at least 6 MPa
- tensile stress modulus in first particle direction: at least 3 GPa
- tensile strength transversely of first particle direction: at least 0.3 MPa
- tensile stress modulus transversely of first particle direction: at least 1 GPa.

63. (Amended) Product as claimed in claim ~~61~~ 62, wherein the ratio lies in the range of 6-80.

64. (Amended) Product as claimed in claim ~~61~~ 62, wherein the wood particles are present in the plastic mass in a quantity of 50-70% by mass.

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65. (Amended) Product as claimed in claim ~~60~~ 61, wherein the polymer is a polyolefine.

66. (Amended) Product as claimed in claim ~~64~~ 65, wherein the polyolefine material is a material selected from the group consisting of polypropylene, ~~polystyrene, and~~ polyethylene ~~or polyacrylate~~.

67. (Amended) Product as claimed in claim ~~61~~ 62, including particles of non-wood material present in the plastic mass in a quantity of 3-25% by mass, ~~wherein the particles include~~ said particles of non-wood material including fibres of natural cellulose polymer.

68. (Amended) Product as claimed in claim ~~66~~ 67, wherein the fibres of natural cellulose polymer are made from a material selected from the group consisting of flax, jute, hemp, sisal, coconut, bamboo and miscanthus.

69. (Amended) Product as claimed in claim ~~61~~ 62, including particles of non-wood material present in the plastic mass in a quantity of 3-25% by mass, ~~wherein the particles include~~ said particles of non-wood material including glass fibres with a length of 4-5 mm and a diameter of 0.013 mm and a ratio of length to diameter in the range of 300-400.

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70. (Amended) Product as claimed in claim ~~55~~ 56, wherein the large particles are plate-shaped having a main plane, the first particle direction extending in said main plane.

71. (Amended) Product as claimed in claim ~~55~~ 56, wherein the product is elongated and the chosen principal product direction is the longitudinal direction of the product.

72. (Amended) Product as claimed in claim ~~55~~ 56, further comprising an additive with a desired influence on chosen properties of the product and selected from the group of additives consisting of the following classes:

- influencers of adhesion between particles with tensile strength and matrix polymer (class H),
- influencers of the properties of the surface of the product, particularly in respect of coatings or adhesives for applying in sandwich structures (class O),
- influencers of the pyrogenic properties (class P),
- influencers of the particle durability (class D),
- blowing means for obtaining a foamed structure (class B).

73. (Amended) Product as claimed in claim ~~55~~ 56, comprising at least one colouring agent or pigment.

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74. (Amended) Product according to claim 55 56, wherein the product forms a ~~first~~ plate-shaped layer, a skin layer being adhered to at least one of the sides of the plate-shaped layer.

75. (Amended) Laminated product comprising a plurality of products according to claim ~~55~~ 56, wherein the products are plate shaped and have main planes, and wherein the plate-shaped products are adhered to one another on their main planes.

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